

WHAT IS CLAIMED IS:

1. A laser apparatus, comprising:
a laser element that emits a laser beam;
5 a detector that detects the laser beam emitted from the
laser beam body; and
a controller that controls the laser element to emit
the laser beam under a plurality of emission conditions in a
ready state, and controls the detector to detect the laser
10 beam emitted in the ready state.
2. The laser apparatus of claim 1, wherein the
emission conditions include an energy of the laser beam and
an emission period of the laser beam, and the emission
15 conditions in the ready state are changed by changing at
least one of the energy and the emission frequency.
3. The laser apparatus of claim 1, wherein the
controller determines control data for controlling an output
of the laser beam for each of the emission conditions based
20 on detection results of the detector in the ready state.
4. The laser apparatus of claim 3, wherein the laser
emits pulses of the laser beam, and the controller
25 determines the control data to control the output of the
laser beam for a predetermined number of pulses from when
emission is initiated.
5. The laser apparatus of claim 3, wherein the laser
30 beam is emitted by applying a predetermined voltage to the
laser element, and the controller adjusts the voltage
supplied to the laser element during a usage state, in which

the laser beam is emitted outside, based on the control data.

5 6. The laser apparatus of claim 3, further comprising
a circulating device that circulates gas in the laser
element, wherein the controller controls the circulating
device during a usage state, in which the laser beam is
emitted outside, based on the control data generated in the
ready state.

10 7. The laser apparatus of claim 6, wherein the
circulating device includes a fan for circulating the gas in
the laser element, and the controller adjusts the rotating
speed of the fan to adjust the circulation of the gas in the
15 laser element.

20 8. The laser apparatus of claim 6, wherein the
emission conditions include a circulating speed of the gas
in the laser element, and the emission conditions are
changed by changing the circulating speed.

25 9. The laser apparatus of claim 3, wherein the
controller adjusts the pressure of gas in the laser element.

30 10. The laser apparatus of claim 9, wherein the
emission conditions include a pressure of the gas in the
laser element, and the emission conditions are changed by
changing the pressure.

35 11. A method of controlling a laser apparatus that
emits a laser beam, comprising the steps of:

emitting a laser beam under a plurality of emission

conditions during a ready state in which the laser beam is not directed outside of the laser apparatus; and
detecting the emitted laser beam in the ready state.

5 12. An apparatus that exposes a substrate by illuminating a pattern formed on a mask with a laser beam and projecting an image of the pattern on the substrate, the apparatus comprising:

10 a laser source including a laser element to emit a laser beam;

 an illumination unit disposed in a path of the laser beam, that guides the laser beam emitted from the laser source to the mask;

15 a detector, at least part of the detector being disposed in the path of the laser beam, that detects the laser beam emitted from the laser source; and

20 a controller functionally associated with the laser source and the detector, that controls the laser source to emit the laser beam under a plurality of emission conditions in a ready state and controls the detector to detect the laser beam emitted from the laser element in the ready state.

25 13. A method that exposes a substrate by illuminating a pattern formed on a mask with a laser beam and projecting an image of the pattern on the substrate, the method comprising the steps of:

30 emitting the laser beam under a plurality of emission conditions during a ready state in which illumination of the mask with the laser beam is prevented;

 detecting the emitted laser beam in the ready state;
and

adjusting the emission of the laser beam to be
illuminated on the mask based on the detection result.

5 14. A laser apparatus that emits a laser beam to an
external device, comprising:

a laser element that emits the laser beam; and

10 a laser controller that receives information from the
external device and controls the emission of the laser beam
from the laser element, wherein the controller determines an
emission condition of the laser beam during a ready state,
in which the external device does not use the laser beam,
based on the information.

15 15. The laser apparatus of claim 14, wherein the
information includes an emission condition of the laser beam
used in an operation which is performed by the external
device after ready state.

20 16. The laser apparatus of claim 14, wherein the
information includes an emission condition of the laser beam
from the laser element in the ready state.

25 17. The laser apparatus of claim 14, wherein the
information includes a target energy of the laser beam
emitted from the laser element.

30 18. The laser apparatus of claim 14, wherein the laser
element emits pulses of the laser beam with an emission
frequency, and the information includes the emission
frequency of the laser beam.

19. The laser apparatus of claim 14, wherein the

external device includes an exposure device that exposes a substrate by irradiating a mask with the laser beam emitted from the laser element and projecting a pattern image of the mask on the substrate.

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20. The laser apparatus of claim 19, wherein the laser element emits pulses of the laser beam with an emission frequency, and the information includes at least one of a target energy of the laser beam and the emission frequency of the laser beam.

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21. The laser apparatus of claim 19, wherein the information includes an emission condition of the laser beam used in an operation which is performed by the exposure device after the ready state.

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22. The laser apparatus of claim 21, wherein the operation of the exposure device includes the exposure of the substrate.

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23. An exposure apparatus that exposes a substrate by irradiating the substrate with a laser beam, comprising:

a laser apparatus including,

a laser element to emit the laser beam, and

a laser controller to control the emission of the laser beam;

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a beam directing system disposed in a path of the laser beam that directs the laser beam emitted from the laser element to the substrate; and

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an exposure controller connected to the laser controller that provides the laser controller information for determining an emission condition of the laser beam

during a ready state in which the laser beam emitted from the laser element is not guided outside of the laser apparatus.

5 24. The exposure apparatus of claim 23, wherein the information includes an emission condition of the laser beam from the laser element in the ready state.

10 25. The exposure apparatus of claim 23, wherein the information includes an emission condition of the laser beam when the laser beam is to be used, after the ready state, in an operational in which the laser beam is guided outside of the laser apparatus.

15 26. The exposure apparatus of claim 25, wherein the emission condition includes a conditions used in the operation for exposure of the substrate.

20 27. The exposure apparatus of claim 23, wherein the information includes a target energy of the laser beam to be output from the laser element.

25 28. The exposure apparatus of claim 23, wherein the laser element emits pulses of the laser beam with an emission frequency, and the information includes the emission frequency of the laser beam.

30 29. The exposure apparatus of claim 23, further comprising a detector for detecting the laser beam emitted from the laser element in the ready state, and wherein the laser controller prepares control data for use in an operation which is performed after the ready state based on

the emission condition of the laser beam used in the ready state and the detection result of the detector, the laser beam being directed outside of the laser apparatus in the operation.

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30. A method for fabricating a device comprising the steps of:

providing an exposure apparatus, the apparatus including a laser apparatus which has a laser element to emit a laser beam and a laser controller to control the emission of the laser beam, a beam directing system that directs the laser beam emitted from the laser element to a substrate, and an exposure controller that provides the laser controller information for determining an emission condition of the laser beam during a ready state in which the laser beam emitted from the laser element is not guided outside of the laser apparatus; and

exposing the substrate by irradiating the substrate with the laser beam emitted from the laser element.

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